Medico Chirurgical Society
Aberdeen
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*History of the epidemic of cholera in Chatham-Roch.....
presented by
J. P. Stratton Esq:
L. R. C. S. E.

DR STRATTON

ON

CHOLERA.

Medico Chirurgical Society
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HISTORY

OF THE EPIDEMIC OF

CHOLERA

IN

CHATHAM,

ROCHESTER, AND STROOD,

IN 1849.

BY THOMAS STRATTON, M.D. EDIN.;

MEMBER EDINBURGH CLINICAL SOCIETY;

SURGEON ROYAL NAVY.

IN A LETTER TO

Sir Wm. Burnett, M.D.; K.C.B.; K.C.H., Medical Director-General of the Navy.

(*From the Edinb. Med. and Surg. Journal.*)

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Member Edinburgh Clinical Society; Surgeon Royal Navy.

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On the 15th of August 1849, two days after arriving in London from America, I was appointed surgeon additional to H.M. ship *Poictiers*, 72, at Chatham, for special service, with reference to the epidemic of cholera then prevailing in that town. My appointment was virtually that of additional surgeon to the Chatham Division of Royal Marines, and it continued till the 26th of October. I remained at Chatham till the 2d of November. On the 14th of November, I transmitted to the Naval Medical Director-General a Report on the Epidemic Cholera and Epidemic Diarrhœa as it appeared in Chatham, Rochester, and Strood, accompanied by a Cholera-map of these towns. I understand that, a few weeks afterwards, my report was sent to the Cholera Committee of the London Royal College of Physicians; and I beg to offer the substance of it, with a few verbal alterations, to this widely circulated Journal.

In 1832, I saw a number of cholera cases at North Shields, and during the winter of 1848-9 I was a very frequent visitor of the Edinburgh General Cholera Hospital, which was under the charge of Dr William Robertson. On the 30th of May 1849, I arrived in a ship from London at Grosse Isle (near Quebec), and Dr Douglas showed me the passengers of two emigrant-ships which arrived there a week before, and on board of which cholera had broken out during the passage; in one ship forty deaths took place, and in the other thirty deaths; in both vessels all at once; no new cases occurred, and none afterwards; this was on the occasion of the ships coming into colder and damp weather on the Banks of Newfoundland. The ships were not near each other; the number of persons on board of each was about 250 or 300. I regret that I did not note the names of the ships, the exact number of persons on board, the port whence they sailed, and whether cholera was then prevailing there. The ships were kept for a week in quarantine under observation, and no new case occurred, which was three weeks after the last case. The instance of these two vessels bears on the disputed question of whether cholera is infectious or not. Anti-infectionists will regard these two instances as in favour of their views, from the disease suddenly ceasing and not continuing almost indefinitely to reproduce itself among the other passengers, as it ought perhaps to have done if propagable by infection. Infectionists, however, will say that all the subjects predisposed or capable of receiving the disease were attacked, and that 40 deaths in 250 or 300 persons were as many as the epidemic cause, aided in some cases by infection, might be expected to produce. In both vessels, the disease broke out suddenly some time after sailing, and it prevailed for about ten days only. Did these ships sail into a choleragenic body of air of a diameter represented by a ten days' sail? Or, instead of this, did a choleragenic stratum of air blow on the vessels' track and remain with them for the ten days, and then leave them?

I was in Montreal * when the epidemic commenced there in the beginning of July, and during a week I spent in New York in the same month the public alarm was very great at the number of attacks, and many in the liner, in which I sailed from New York, were glad to leave the scene of so much risk and danger.

Topographic Sketch.

A stranger arrives by rail from London in an hour and a-half, and sees the town of Strood, which is connected by a bridge over the Medway with the city of Rochester; entering Rochester, he sees on his right, Fort Clarence, and the interesting Norman

* There is an interesting paper on Cholera, by Dr Hall of Montreal, in the *British American Medical Journal* for August 1849.

ruins of Rochester Castle. Driving through the cleanly High Street of Rochester, he sees on his right Fort Pitt and then enters the High Street of Chatham, which, on the right, is quite continuous with Rochester; on the left a few acres of low-lying ground, occupied by market-gardens, intervene between the street and the Medway. This ground is only a foot or two above the usual high-water level, and I was informed that the gardens are leased on the terms, that the rent is to vary according to the injury done the crop by the overflowing of the river. At this point, on the other side of the street, the boundary-line between Rochester and Chatham is close to St Bartholomew's Chapel, the Chapel of St Bartholomew's Hospital, the ancient Leper Hospital of Chatham, of which I intend to send an account to a future number of this Journal. Fort Clarence is situated on a considerable eminence behind Rochester, and is perhaps 300 feet above the level of the Medway. It was built in 1800, and some time after was used as a military lunatic asylum. It is now used as a military prison, and soldiers are sent to it from all adjacent parts. (There are other three general military prisons in England, one in Scotland, and two in Ireland). My friend, Dr Swan of the Army Medical Staff, is at present its medical officer. As marines from Woolwich and Chatham are sent thither, a few remarks on the establishment may be here permitted.

The prisoners are divided into three classes; the third or worst class are at hard labour, employed in carrying a shot of the weight of thirty-two pounds; the second class carry a twenty-four pound shot; the first or best class are not put to this kind of punishment; they are three hours a-day so employed, half of the time in the morning, and the other in the afternoon. Weakly men are not ordered this shot exercise. A few of the prisoners are employed at trades, as tailors, shoemakers, and carpenters, but only so far as any of this kind of work is required within the prison. The prisoners are not allowed to converse with each other. When they are locked up, each man is placed in a separate cell, which has an arched roof, and is quite free from damp, as over this is a slated roof; the cells are warmed by means of heated air, and gas is burnt in them till eight in the evening. There is a school for giving instructions to some of the men in the evenings.

The men carry the shot a little distance,—about ten paces,—lay it down, pause for a minute or two, then take it up, and carry it back again. This kind of labour being entirely useless is likely to be mentally-irritating to those engaged in it. Would it not be better to employ them at their respective trades when they have any?—and for the others, who have not been brought up to any trade, and do not understand any kind of skilled labour, productive occupation might be found in picking oakum or in break-

ing stones for the roads,—this being, for several reasons, to be preferred to the vain labour of *piling shot*, an occupation somewhat like that to which Sisyphus the son of Æolus was condemned in a certain place. The pecuniary returns from the labour might go towards the prison expenses, and a small proportion of it to the prisoners themselves for their encouragement. I understand that *shot-drill* is the name officially given to this kind of punishment; the word *drill* ought not to be associated in the soldier's mind with any kind of punishment, and on this account, the name is objectionable. This kind of bodily exercise seems likely to induce hernia in those disposed to it.

Fort Clarence is supplied with water from a deep well within the fort, the pump being worked by five or six prisoners, and not, as in Fort Pitt, by horses. The view from Fort Clarence is very commanding and beautiful, looking down on Rochester cathedral and castle, the river Medway; on one side the undulating surface of Kent, aptly styled the garden of England, and on the other the *Chathamic* cluster of towns. There is a supposition that an underground passage leads from the fort and opens close to the high water mark in the river; also, that another underground passage connects this fort with the neighbouring one.

In this elevated situation, one severe case (Moss, private, Royal Marines), and two slighter cases of cholera occurred, and likewise a good many cases of diarrhœa. All these cases originated in the fort. The amount of intercourse or communication between the fort and the town of Chatham was that the officials and servants were in the habit of visiting it, as usual, and the military guard over the prisoners was as usual changed every twenty-four hours, and was supplied from the Chatham line-barrracks or some of the other barracks. The total number of persons living in the fort might be about 150.

At a short distance from Fort Clarence is situated Fort Pitt. Fort Pitt was built about the year 1800, and was named after the great statesman who took his titular name from Chatham. It looks down upon the back part of Chatham; it is now used as a military general hospital, chiefly admitting invalid soldiers arriving from abroad. In a sanitary view the hospital is in an excellent position, except perhaps that for invalids with chest-complaints, arriving from hot climates, the situation is rather exposed. As the hospital-buildings were built for barracks, the wards have some defects which they would not have had, if they had been erected for their present purpose. The windows are very high above the floors, lessening the cheerfulness of the rooms. The surrounding ground is laid out in a very ornamental manner in walks and shrubberies, and the convalescents are allowed to roam about over them. This must have an excellent effect in aiding the restoration to health of soldiers returning

with chronic diseases from abroad. This plan of laying out the ground surrounding an hospital, and the system of making this use of it afterwards, is well worthy of imitation by similar institutions in other places.

A large museum of morbid anatomy, natural history, and foreign curiosities has been formed and supported by the industry and liberality of the army medical officers, who have also an excellent library and reading-room. Before receiving their commissions, the future assistant-surgeons of the army are here for a period varying from a few weeks to as many months; including eight or ten candidates, there are twenty-four medical officers at present connected with this medical depot.

There are about 200 patients in the hospital; besides resident patients, there are in the course of the year many hundreds of soldiers arriving here to be invalided; a medical board inspects them, some are discharged from the service, and others are sent back, after more or less time, to their respective regiments.

Fort Pitt is probably about 300 feet above the level of the river; it is supplied with water from a deep well within the fort, the pump being worked by three horses. I believe the inmates of the fort were about 300 in number. In this high situation there were five deaths from cholera. Three soldiers and two wives of soldiers died of cholera. The two female cases were taken to Fort Pitt hospital from the town of Chatham; two of the male cases also were admitted sick into Fort Pitt from St. Mary's barracks. Two cases of cholera originated in the Fort, one was fatal; the other recovered; one was an orderly, the other was one of the patients, and neither of them had been near the cholera patients. Among the non-invalid inmates of the fort, there were about 30 cases of diarrhœa during the prevalence of the epidemic. Surgeons Dartnell, Jameson, and Macdiarmid were among the medical officers here at the time. I shall first give a brief account of each of the public establishments, and then offer a few remarks on the different towns here.

Passing down the hill from Fort Pitt, we cross the High Street of Chatham, which is in the bottom of the valley, and then gradually ascend what is called the military road, passing on the left the Marine barracks, and on the right Chatham line-barracks, then Melville Hospital on the left, and then enter the town of Brompton, at the farther end of which are Brompton barracks. Still farther on, and towards Gillingham are situated:—

St. Mary's Barracks are close to the river, in a site not very desirable. They can accommodate about 400 men, besides women and children. At present they are very crowded; I understand they are occupied generally by transient invalids, before and after their being examined at Fort Pitt. In St Mary's bar-

racks, a soldier's son, aged eleven, died of cholera; and two soldiers ill of cholera were sent to Fort Pitt, where they died.

Brompton Barracks surround a large, beautiful, and airy barrack square, built at first by the Hon. East India Company, and now occupied in part by some of their depots, and by the Royal Engineers, Royal Artillery, Sappers and Miners, and also by a few men of different regiments At present * about 150 men of the Royal Marines sleep here, as their own barracks are crowded; but they mess in the marine barracks, and are supposed to be there the greater part of the day. The Brompton barracks are supplied with water from a deep well on the spot; their situation is very high and healthy. There are about 500 men here; they had two cases of cholera, one in an artilleryman, and the other in a sapper. During the epidemic the soldiers frequented as usual the town of Brompton, but were not allowed to enter the town of Chatham; this arrangement involved their not visiting Rochester and Strood.

Passing through the High Street of Brompton, and descending the military road, we come to the

Chatham Line-Barracks are called line-barracks to distinguish them from the marine barracks. They are well situated on the slope of a hill, and, Major Smith, barrack-master, informs me, contain accommodation for 2800 men. At present they contain H.M. 17th regiment, the depots of a number of regiments, and many detached men belonging to various regiments, altogether about two thousand men. There are also about four hundred women and children. The garrison-hospital is well placed at the upper and east corner of the barrack-ground. The *Spur Hospital*, another military hospital, is near it. In the garrison-hospital a soldier of the 96th regiment and one of the 53d regiment, died of cholera. Thus there were two fatal cases of cholera among 2400 persons. These barracks are supplied with water from the Melville Hospital reservoir.

Marine Barracks.—The lower wall of the line-barracks runs along the military road, on the other side of which are the Marine barracks, exactly parallel to the other, and situated lower down the hill. On entering the gate, the visitor sees a very fine parallelogram, one side of which has a railing between it and the road; the two ends are occupied by officers' quarters, and the opposite side by a range of building, being the men's barrack. In front this building is of three storeys and a sunk storey; to the rear, as the ground falls, it is of four storeys. Behind this building and nearer the river is a narrower parallelogram, on the other

* I beg to observe that, except when otherwise specified, these remarks throughout this account apply to the period from the middle of August to the end of October 1849.

side of which is a long narrow building, chiefly for store rooms; the other side of this building is close to the Medway. At the east end of the barracks, the road leading to the *New Stairs* separates them from H.M. Dockyard. At the west end of the barracks the back part of the buildings forms one side of Church or Cat Lane, where one of the earliest cholera deaths occurred (Aug. 5), and whence, I believe, the two fatal female cases were conveyed to Fort Pitt. These barracks are supplied with water from the same well, whence is filled the Melville Hospital reservoir. The proportion of cases to men, and the localities in the barracks furnishing the cases will be mentioned afterwards.

H.M. Dockyard.—There are ten or twelve dwelling-houses in the yard, and most of them form a terrace which is of the same height above the Medway as the military road. About sixty or eighty persons reside within the yard. The artificers and labourers, who are always varying in number, reside in the town. One cholera death occurred in the yard.

On Thursday, August 29, in the afternoon, Mr V., aged 52, one of the officers of the yard, was looking on at the cleaning of a very offensive drain near *the Brook*, and close to some houses of which he was the owner. During the evening he felt quite well, as usual, and had a party at his house. Next morning, at four o'clock, he was seized with cholera, and died at 2 P.M., after ten hours' illness. Perhaps if he had not exposed himself near the drain, he would not have been taken ill. But an evening party, a supper with some unusual dishes, and an attack of cholera a few hours after, have been known to be connected with each other. The water used in the dockyard is derived from Melville Hospital reservoir.

Melville Hospital is also called the *Royal Marine Infirmary*. It is the hospital of the Chatham Division of Royal Marines, and it also serves as a naval hospital for Chatham and Sheerness. Before its erection I understand that a building at the upper and west end of the marine barracks (now used as officers' quarters) was the marines' hospital; and naval patients were accommodated in a hospital-ship lying here. The building was named after Viscount Melville, a great (and much required) benefactor of the naval medical department. It was built in 1824, of brick, painted stone colour, at a cost of L.107,000. The apartments for sick officers, and the wards for men, are everything that can be desired in an hospital; the general plan of the building, and all its details, are excellent, and after having been over a great number of hospitals in Europe, British America, and the United States, I have not seen one I prefer to Melville Hospital. It was under the excellent superintendence of Deputy-Inspector Drummond, the other officers being Surgeon Leonard and Assistant-Surgeons Pearce, Ward, Rimell, Jack, and Emslie. In front of the building is a spacious lawn; behind it is some orna-

mental ground; behind which is a terrace, on which are the houses of the medical officers; behind them is some garden ground, shut in by a wall from the military road, on the other side of which is the Reservoir. All this ground is on a slope; the upper part being about 90 or 100 feet above the level of the Medway.

Melville Hospital Reservoir is in Brompton, between the military road and Prospect Row, from which there is an extensive view over towards Rochester and Strood. The reservoir occupies an area about sixty paces square; the bottom and sloping sides are paved with square stones (street fashion); it is surrounded by an iron railing, (the key of the enclosure being in the care of the deputy-inspector of Melville Hospital). A deep well in the dockyard has a pump worked by a steam engine, which throws the water up into the reservoir; the engine is at work every day except Sunday, or, as we say in Scotland, every lawful day. From the reservoir, water descends to supply Melville Hospital, the Garrison Hospital, the Dockyard Houses, Chatham Line Barracks and the Marine Barracks. In May or June, weeds are apt to appear in it, and the reservoir is then annually emptied and cleansed.

Sources of Water Supply.—I am careful to indicate the sources of water supply of the various public establishments, and of the inhabitants generally, with reference to any theory of the degree of cholera prevalence being connected with the quality of the drinking water in use. In these towns there are no public waterworks; there are along the streets, at convenient distances, pumps in use for supplying all the houses nearest to them. For the sake of those not acquainted with Chatham, it may be as well to mention, that, from the influx of salt water brought by the tide, the water of the river Medway is not potable at this place. Mr Ranger* proposes to bring water to supply Chatham and Rochester from Boxley Abbey Spring, five miles distant. The Line barracks and the Marine barracks use the same kind of water, and they suffered very unequally from cholera; there were more cases in proportion in the Marine barracks, probably from their being situated at a lower elevation than the other. As far as the facts observed in these two barracks go, there is no reason to attribute to the quality of the water any influence on the epidemic.

Brompton.—The town of Brompton is pleasantly situated. It is elevated and well aired, being much more healthy than Chatham, and somewhat more so than Rochester, and for invalids with various chronic diseases, and for sickly children, a removal from either of these places to Brompton, though only the distance of one or two miles, will often be followed by evident advantage,

* In a pamphlet entitled *Report to the General Board of Health on the Town of Chatham, by Mr Ranger, C.E., 11th June* 1849. Pp. 18.

from the beneficial change of air. The High Street and the principal other streets are kept in a tolerably clean state, although some of the arrangements for drainage are a little defective. Some of the streets are on a pretty steep incline, so that rain and other water runs off easily. Some courts and alleys were in a bad state; to improve which, a few efforts were made by the inhabitants, to which they were perhaps stimulated a little by the commandant of Brompton barracks threatening to confine the soldiers to barracks, if the town was not kept in a more cleanly state. During the epidemic, the soldiers were not allowed to enter Chatham; but Brompton was open as usual; while the arrangement was a loss to shopkeepers in Chatham, their loss was an additional advantage to those in Brompton.

Chatham.—This town is the lowest situated of this cluster of towns; some parts of the High Street, and some lanes and courts off it, are only a few feet above the high water level. What is called *The Brook* represents what originally was probably a beautiful and romantic rivulet or burn, but is now a ditch filled to overflowing by contributions from all the drains near it. It is an uncovered drain, about four or five feet wide, and from three to five feet deep; its contents are half-solid; bubbles of gas are constantly rising to the surface, and the odour of it is, to strangers, most intolerable; and along its banks are erected a number of overhanging necessaries. This "Brook" stagnates in a winding ditch in the bottom of the valley, and for the distance of half a mile it has houses close to it. The tide rises in it; and about 150 yards from where it joins the Medway, the rise is about a foot. This so-called *Brook* ought to be arched over throughout its whole length; it is at one or two points covered in for a few yards; but this partial covering, though beneficial to those living nearest to these spots, makes the exhalations more intense at other parts. Some married men of the marines live on the Brook; such ought to be recommended to live in Brompton. In houses here, Mr Jack has seen a good many severe cases of low fever, and diarrhœa often prevails. I spoke to some of the residents on the Brook about the propriety of having it covered over: they said they did not feel any inconvenience from the odour, and that its being open was more convenient for throwing water &c. into it! Such is the effect of habit, and, it must be added, such is the stupidity of some people!

Some of the courts near Holborn Lane and the High Street are built with a marvellous attention to intricacy, small courts being, as it were, within others, and the greatest difficulties being opposed by man to any ventilation by nature. These lanes are between the High Street and the Medway; and of some of the houses the ground-floor is barely above the level of high-water.

Some married men of the marines live in these courts, and, for a single small room in this low, damp, and unhealthy situation, pay the rent of two shillings and sixpence a-week, or six pounds four shillings a-year. In these lanes, the children have a very sickly appearance; bowel complaints are prevalent all the year round, and there are occasional outbreaks of low fever. In Mr Ranger's pamphlet, Dr Ely, one of the oldest practitioners in Chatham, gives this account of these lanes. Mr Jack has found the account to be so confirmed for the last two or three years since coming to Chatham, and my own observation and practice there are to the same effect.

Passing along the High Street of Chatham, we next see on the right hand some ground set apart for market gardens, lying between the street and the Medway; beyond this we enter the city of Rochester, and are immediately struck with the much more cleanly state of the street than is exhibited in Chatham. The houses, also, have a better appearance; and the proportion of inhabitants in comfortable circumstances, and with habits of attention to cleanliness, is evidently much greater than it is in the former town. The ground now rises a little, and does so all the way gradually, on to the end of Rochester, near the bridge over the Medway. Gillingham is a village closely adjoining Brompton. New Brompton is a suburb of Brompton. Luton is a village near Chatham.

Of the Epidemic Cholera in Chatham in 1832.—When cholera was last epidemic in Great Britain, it prevailed in Chatham in 1832; but I was unable to discover accurately the number of cases and deaths from it, as registration was then imperfect. I intended learning the number of deaths in 1831 when there was no cholera, and comparing this with the number in the cholera year of 1832; in this way we might approximately learn the number of deaths from the epidemic, on the supposition that cholera deaths are a clear addition to the usual mortality. (This was found to be the case in Exeter in 1832.*) The Melville Hospital records for 1832 were not at hand; but Mr Drake informed me that four cholera deaths occurred in the hospital. Several persons of whom I inquired said there were only *a few cases*. A friend of mine, a non-practising surgeon, and who from his profession might naturally be supposed to take a moderate interest in the subject, said to me, at the close of the epidemic in 1849, that he believed there had been only a few cases;—his idea was, that there had been about fifteen or twenty deaths,—when in reality there had been 167. This shows that it is impossible to reach any accuracy by trusting to the unstatistical word *few*. It is not unlikely that the epidemic prevailed in Chatham to about the same

* History of the Cholera in Exeter in 1832. By Dr Shapter. London, 1849.

degree in 1832 that it did in 1849. There were no daily or weekly accounts of the numbers of cases or deaths made public; and of the three registrars even, each knew the particulars only within his own district. This circumstace is worthy of note with regard to any theory of predisposition to any attacks being given by alarm at any published accounts of their number. If this be an occasional element in the causation of the disease, it did not exist in Chatham. This makes simpler the inquiry into the respective powers of the *epidemic influence* and infection.

Of a Non-Epidemic Outbreak of Algid Cholera near Chatham, in 1848.—In 1849, the first death from cholera in Chatham occurred on the 28th of July,—(there was one in Strood on the 20th of June); but in the previous year, in the Hamlet of Grange, a mile from Gillingham Church, and in the same parish, there were eleven cases of cholera, of which nine were fatal between the 8th and the 11th of December 1848. They all occurred in three families, occupying two houses on Copperas Creek, which at high water carries the tide close to their doors. There had been no cholera there before since about 1832. The cases were attended by my friend Mr Weeks, and were also seen by Mr Jack. I inquired particularly whether great coldness was one of the symptoms, and was informed that it was. Some may consider that this minute or miniature epidemic ought rather to be considered as a group of cases of sporadic or British cholera; but the great coldness and the great fatality are against this view. We might have suspected their nature to be sporadic if they had occurred in one family, as here we might have supposed some cause in their food; but when so many as three families were attacked, a dietary cause is less likely to have been the real occasion of the seizures. This instance, perhaps, resembles those cases in which cholera suddenly attacks a solitary ship on the ocean, and after raging violently for a short time, suddenly leaves it, as in the two instances mentioned in the beginning of this communication.

Assuming that the Grange cases were not spasmodic or British cholera, the non-prevalence of the disease at that time in the neighbourhood shows that the term *epidemic cholera* is not always correctly descriptive of the malady. *Algid cholera* is perhaps the most unexceptionable term, but has rather an affected sound. *Asiatic* is an awkward term for any disease out of Asia. Apparently, *sporadic* or *British cholera* are most convenient names for the one complaint, and *epidemic cholera* or *the cholera* for the other.

As to great coldness being a diagnostic symptom between sporadic and epidemic cholera, although in the former there is occasionally some unnatural coldness, it is so much later in appearing, so much less general over the body, and so much less in degree,

as to be perfectly distinguishable from the same symptom in epidemic cholera, (not to refer here to other inter-diagnostic symptoms.)

Of the Precautionary Measures adopted in 1849.—A few sentries were placed, to prevent the marines and soldiers from entering Chatham Proper, the troops being restricted to Brompton. Married men of the marines, who happened to reside in Chatham, continued to reside there as usual. This arrangement continued till the middle of September. In Chatham Line-barracks, the beer, ale, porter, and spirits coming into the canteen were inspected by a medical officer and a quartermaster; the soldiers were medically inspected daily at 6 A. M., and the women and children at 2 P. M. Some married soldiers belonging to the Line-barracks, who had formerly been allowed to reside out of barracks, were now required, with their wives, to reside in barracks. Where these men had been residing in Chatham, the change was for the better; but I imagine that most of them were residing in Brompton, and here the change was for the worse, being to a lower elevation. In Brompton barracks there was a daily medical inspection of the men; I believe the beer and other articles received into the canteen were not looked at. At the Marine barracks there was a daily medical inspection of the men at 6 A. M.; the sergeants were instructed to advise the men to apply immediately when any bowel complaint appeared; they were also to remind the men about wearing their flannel belts, of which each man had two or three. Articles received at the canteen were not examined.

With respect to the utility of these measures, some men confined to barracks are restricted to the canteen, when wishing to obtain spirits or other drinks; but most men are as likely to visit other taverns in the town, so that examining the quality of the drinkables at the canteen has not much effect in securing unadulterated specimens of these liquids for the soldiers' use. This examination, however, has a little effect, and a little alarm in the canteen-keeper will have some wholesome effect in preventing him from imposing on the soldiers. During a cholera-epidemic, very sour beer may create a diarrhœa, which may become of more consequence than at ordinary times. At these canteens they are not unlikely to have for sale, cabbages and similar vegetables in a stale condition. As for the hour of the medical inspection, six in the morning was too early, and any hour after eight would have been better, as some of the mornings were cold and damp; and unnecessary exposure to such, two hours before breakfast, is not advisable during a cholera-epidemic.

It is a curious fact, that in the Chatham line-barracks, during

the epidemic, there were fewer cases of sickness than before or after; the reason of this probably being, that the soldiers were unable to visit scenes of drinking and other dissipation in the low lanes of Chatham.

The use of white duck trowsers is now discontinued in the line, but in the Marines, Artillery, and Sappers, they are still in use. During a cholera-epidemic in autumn, it will be not unworthy of consideration, that a return to the use of the warmer cloth trowsers before the usual time will sometimes be advisable, as the temperature of the season may not exactly correspond with the dress regulations.

At this time there were fewer naval ships in commission than usual, and in consequence there were more marines on shore than is customary. This led to the barracks being much crowded, and an idea was entertained of placing about four hundred marines on board one of H. M. ships in ordinary here, merely to give them barrack-accommodation. This idea, however, was not acted on. The *Black Prince*, of 74 guns, and 1751 tons, was thought of for this purpose; this ship lay about a mile from the New Stairs, and at low water on one side there was a wide expanse of wet ground uncovered by the retiring tide. H. M. ship *President*, of 50 guns, and 1537 tons, in ordinary, near the New Stairs, and close to the barracks and to Melville Hospital, would, on several accounts, have answered much better. But except where it is unavoidable, it is not advisable, during a cholera-epidemic, to remove men from buildings on shore to the lower situated and damper situation of ship-board, as there is much more risk from the epidemic in the latter situation than on land.

Connected with this subject is the choice of a situation for persons detained in quarantine; and in doing so it would be well to avoid a cold, damp, marshy, cheerless, catarrhal, rheumatic, and agueish situation like Standgate Creek, and to have one less rich in disqualifications. A cheerful situation on land, with green fields around it, would answer as well for detaining persons kept under observation, and would tend much more to the recovery of any sick persons. In Dr Bryson's work on the Epidemic Fevers of Sierra Leone are some excellent remarks on the choice of situations for quarantine establishments.

In Brompton, Chatham, and Rochester, there was a little done by the inhabitants in the way of cleaning the streets and lanes, and whitewashing courts, &c. In Chatham, where this was most wanted, there was least done. Towards the close of the epidemic, some advertisements appeared respecting a (so-called) Board of Health; this was composed of about a dozen non-medical persons, whose proceedings and exertions were known only to themselves.

Number of Cases of the Epidemic.—It was impossible to ascer-

tain the number of *cases* of cholera and of epidemic diarrhœa that occurred in these towns, as private particulars did not make any returns to any board of health, It would indeed have been too much to expect a private practitioner to take the unpaid-for trouble of making any returns to a non-medical board. If all the civilian practitioners had been constituted a board, and one of their number to act as secretary who should be paid for his trouble, then we might have expected a numerical list to be kept of the daily number of new cases of cholera and of diarrhœa. The cholera deaths in Strood, Rochester, and Chatham, numbered 167; if we suppose that there was one death in every three cases, this would make 501 cases of cholera, exclusive of diarrhœa. If we imagine one death in five cases, then there would have been 835 cases of cholera, not including diarrhœa. We may expect that cholera mortality among marines, troops, and seamen on board of H. M. ships, will be much less than in the general population of a town, and for these reasons, that over the poorer inhabitants there is a less careful sanitary supervision, and against them there is their poverty, the bad situation and condition of their dwellings, their very dissipated habits, a less unremitting attention after being taken ill, and in cholera hospitals a description of nurses less to be depended on. In any town, when a cholera hospital is opened, it is generally difficult to procure good nurses; generally speaking, fear of infection and too low wages keep trustworthy women from applying for the situation; and none are to be procured except women little to be depended on, and some of whom drink the brandy and similar liquids ordered for the patients, and are, especially at night, likely to be for some hours too intoxicated to attend to the sick. These scenes must have been witnessed by all who have attended cholera civil hospitals, where whisky and brandy were among the remedies in use. There is no disease where it is of greater consequence to have careful and attentive nurses than in cholera; the short time this disease requires to run its course makes it necessary to make good use of every minute of it. In Melville Hospital (and also in Woolwich Marine Infirmary) they have male nurses, and not female ones as in Haslar*

* With respect to the cholera in Haslar or Portsmouth Naval Hospital, I beg to quote from Dr Wilson's interesting account. He arranges the cases under four heads :—

A. Cholera abiliosa; of 49 cases, 26 were cured, 15 died, and 8 remained.

B. Cholera biliosa; of 25 cases, 19 were cured, and 6 remained.

C. Febrile diarrhœa; of 53 cases, 44 were cured, and 9 remained.

D. Convulsive colic; of 11 cases, 10 were cured, and 1 remained.

The patients and officials numbered 600, and no case originated in the hospital. The treatment was two-grain doses of calomel, and turpentine as an astringent, and to aid the effect of the calomel. Dr Wilson is a non-infectionist, but he says that it would be unsafe to assert that cholera can never, under any circumstances, become contagious (p. 22).—*Treatment of Cholera in the Royal Hospital, Haslar, in* 1849. Simpkin and Marshall, London, September 1849.

and Plymouth Naval Hospitals. The men make much better nurses than women, contrary to what might be at first supposed. The nurses are selected from among the privates of the Royal Marines; they are attentive to all orders, and can be easily and at once changed and sent back to their usual duty, if they are not sober, attentive, and found to answer fully to what is required of them.

Strood District Cholera Mortality.—Mr Gates, parish-clerk, is registrar for the Strood District, which is in the North Aylesford Union, and contains the parish and town of Strood, and the parishes of Frindsbury, Cliffe, Higham, Caxton, and Halling. A bridge across the Medway connects Strood with Rochester; Frindsbury closely adjoins; Higham, Caxton, and Halling, are rural parishes two or three miles distant. The first registered death occurred on the 20th of June, and the last on the 14th of September. After the first death, there was no death for four weeks; but it is most likely that a few cases were going on during the time. If we reckon continuously from the first death, the epidemic lasted thirteen weeks; if we exclude the first death and the next four blank weeks, then the duration of the epidemic was eight weeks. I think the former view is the more correct one. The weekly progress of the epidemic is best shown in a tabular view:—

Table I.

In the First Week, ending on Saturday,			June 23,	1	death
In the	Second	,,	,, June 30,	0	,,
	Third	,,	,, July 7,	0	,,
	Fourth	,,	,, July 14,	0	,,
	Fifth	,,	,, July 21,	0	,,
	Sixth	,,	,, July 28,	7	,,
	Seventh	,,	,, Aug. 4,	6	,,
	Eighth	,,	,, Aug. 11,	1	,,
	Ninth	,,	,, Aug. 18,	2	,,
	Tenth	,,	,, Aug. 25,	3	,,
	Eleventh	,,	,, Sep. 1,	4	,,
	Twelfth	,,	,, Sep. 8,	10	,,
In the Thirteenth Week, ending on Saturday, September 15,				7	,,
			Total,	41	deaths

Of the 41 deaths, there were 26 in Strood parish, 12 in Cliffe parish, 3 in Frindsbury parish, and none in the other three parishes: 22 were males, and 19 were females.

Of Strood parish the census in 1831 was 2722; in 1841, the last census, it was 2881, showing an increase of 159, or 16 for each of the ten years. From 1841 to 1849, there are 8 years,

and multiplying 16 by 8, we have 128 to add to 2881, making 3009 as the estimated population in 1849. Twenty-six deaths in 3009 inhabitants is one death in 115 of the population.

Of Cliffe parish the population in 1831 was 832; and in 1841 it was 842. In 1849 it may be said to be 850, and 12 deaths in 850 inhabitants is one death in 71 of the population. The population of Frindsbury is not given in a separate and distinct way in any publication I have been able to discover. The duration of the cases, their ages, and some particulars bearing on the subject of infection, will be mentioned afterwards.

Rochester-District Cholera Mortality.

Mr Furrell, auctioneer and appraiser, is the registrar of this district, which includes the city of Rochester and the west part of the town of Chatham, that part lying south and west of the Chatham and Maidstone roads and the military road. The first death occurred on the 30th of July and the last on the 3d of October, the duration of the epidemic being ten weeks. On the 30th of July, two deaths took place in Fort Pitt (which is in the district); they were women removed sick from Chatham; the first death in the town of Rochester was on the 9th of August, this was the eighth death in the district. The weekly progress of the epidemic was as follows:—

Table II.

First Week, ending on Saturday,		4th August,	5	deaths.
Second	,,	,, 11th August,	4	,,
Third	,,	,, 18th August,	7	,,
Fourth	,,	,, 25th August,	13	,,
Fifth	,,	,, 1st Sep.,	5	,,
Sixth	,,	,, 8th Sep.,	7	,,
Seventh	,,	,, 15th Sep.,	4	,,
Eighth	,,	,, 22d Sep.,	1	,,
Ninth	,,	,, 29th Sep.,	1	,,
Tenth Week, ending on Saturday,		6th Oct.	2	,,
		Total,	49	deaths.

The weekly mortality of this district is more regular and uniform in its rise, progress, and decline than that of Strood. Except the five deaths in Fort Pitt, all the others were those of habitual residents. Of the 49 district deaths, 29 were in the town of Rochester and 20 in that part of Chatham included in the Rochester registration district. Of Rochester city, the census in 1831 was 9891; and in 1841, it was 11,026, showing an increase in ten years of 1135, or an average annual increase of 113½. From 1841 to 1849 are eight years, and multiplying 113½ by 8, we have 908 as the increase up to 1849; adding 908 to 11,026, we have 11,934,

as the population of Rochester in 1849; and 29 deaths to 11,934 inhabitants is one death in 411½ of the population, or, excluding four cases carried sick to Fort Pitt from Chatham, one death in 477 inhabitants.

Of that part of Chatham included in the Rochester-district, the population in 1831 appears not to have been ascertained; in 1841, it was 5298. Supposing that the population has increased in the same ratio as that of Rochester, the population of this part of Chatham in 1849 may be said to be 5724; and 20 deaths to this number of inhabitants is one death in 286 of the population. Forty-nine district deaths in the district population of 17,658 is one death in 360 inhabitants. Of the 49 deaths, 27 were males and 22 females. That there were more deaths in proportion in the Chatham part of Rochester district, is probably explained by the circumstance that Chatham is situated in a lower elevation, is kept in a less cleanly state, and has more inhabitants of unsettled and unsteady habits and in poor circumstances than Rochester. In this district I could not discover any facts bearing on the subject of infection. The duration of the fatal cases and their ages will be mentioned afterwards. The 29 Rochester deaths include 5 at Fort Pitt, of which four (two women from Church Lane, and two soldiers from St Mary's Barracks) originated in Chatham; so that 25 is the number of deaths strictly belonging to Rochester proper, and 25 deaths in 11,934 inhabitants is 1 in 477 inhabitants.

Gillingham District Cholera Mortality.

Mr Tracey, bookseller, is the registrar of this district, which includes Gillingham village and parish, the hamlet of Grange, the suburb of New Brompton, the town of Brompton, the village of Luton, and the east part of the town of Chatham. It includes St Mary's Barracks, Brompton Barracks, Melville Hospital, the Marine Barracks, Her Majesty's Dockyard, the Line Barracks, the Spur Hospital, the Garrison Hospital, and Chatham Workhouse. The three registrars, Messrs Tracey, Furrell, and Gates, favoured me with all the information I requested, and I take this opportunity of thanking them for the obliging disposition they evinced. The first cholera death occurred on the 28th of July, and the last on the 28th of September,—the duration of the epidemic being nine weeks. There were 77 deaths,—47 in males, and 36 in females. The weekly rise, progress, and decline of the epidemic was as follows:—

Table III.

In the first week, ending on Saturday, 4th August,		2 deaths.
Second,	„ „ 11th August,	2
Carry forward,	.	4

	Brought forward,		4	deaths.
In the third week, ending on Saturday,	18th August,		17	„
Fourth, „	„	25th August,	11	„
Fifth, „	„	1st Sep.,	14	„
Sixth, „	„	8th Sep.,	13	„
Seventh, „	„	15th Sep.,	11	„
Eighth, „	„	22d Sep.,	3	„
In the ninth week, ending on Saturday,	29th Sep.,		3	„
	Total,		77	deaths.

The epidemic was tolerably regular in its decline. The following are the chief localities of the cholera deaths :—

Table IV.

	No. of Deaths.		No. of Deaths.
Jeffrey's Place, Chatham,	10	Church or Cat Lane, Chatham,	2
Caroline Square, do.	5	Chatham Hill,	2
Medway Union Workhouse, do.	5	New Brompton,	3
Whitaker Square, do.	2	Garden Street, Brompton,	1
Richard Street, do.	1	Grange Hamlet,	2
Best Street, do.	1	Gad's Hill, Gillingham,	10
High Street, do.	2	The Street, do.	4
H. M. Dockyard, do.	1	St Mary's Barracks, (Gillingham Parish.)	1
Mill's Terrace, do.	2	Park Place, (Gillingham Parish.)	1
Full-a-Love's Alley, do.	1	Brittan's Farm, (Gillingham Parish.)	1
Langley's Lane, do.	1	Cage Lane, (Gillingham Parish.)	1
Cross Street, do.	3	Hard's Town, (Gillingham Parish.)	1
Beacon Hill, do.	1	Exmouth Terrace, (Gillingham Parish.)	1
Garrison Hospital, do.	2		

Besides the above, there were six fatal cases in Melville Hospital, of which five were admitted from the Marine Barracks, the sixth was that of an hospital servant. In the Marine Barracks a child (Day) died of cholera.

The following table shows the cholera mortality according to ages, and in the three districts :—

Table V.

Aged	Deaths in the District of Strood.	Rochester.	Gillingham.	Totals.
Under 15 years,	11	11	27	49
15 to 30 years,	11	8	16	35
30 to 45 years,	5	6	11	22
45 to 60 years,	8	11	12	31
Above 60 years,	6	13	11	30
Totals,	41	49	77	167

I intended to have added here a table showing, in any thousand of the population, what proportion of persons there are of each of the above five groups of ages, in order to illustrate the connection between cholera fatality and age.

It was impossible to procure the population of Brompton and Gillingham, and the Gillingham part of Chatham separately; in 1831 it would appear that no separate census was taken, and in 1841 it is not distinctly stated. If we had the numbers of the population, it is likely we should find that in Brompton there were fewer proportionate deaths than in the town of Rochester. The Gillingham part of Chatham would probably show about the same proportionate mortality as that part of it within Rochester district.

General View of the Epidemic in the three Districts.

We may now take a general view of the epidemic in the three registration districts. Not reckoning a solitary death in Strood in the week ending 23d June, and passing over four blank weeks, the duration of the epidemic might be said to be eleven weeks, from the 22d of July to the 6th of October. But during the four weeks when there were no deaths, it is most likely that cases of the epidemic were going on; and it is probably more correct to say that its duration was sixteen weeks, the first death having taken place on the 20th of June, and the last on the 3d of October.

Table VI.

Number of Cholera Deaths in the Districts of

Week	Ending on Saturday	Strood.	Rochester.	Gillingham.	Total.
1st	23d June,	1	0	0	1
2d	30th June,	0	0	0	0
3d	7th July,	0	0	0	0
4th	14th July,	0	0	0	0
5th	21st July,	0	0	0	0
6th	28th July,	7	0	0	7
7th	4th August,	6	5	2	13
8th	11th August,	1	4	2	7
9th	18th August,	2	7	17	26
10th	25th August,	3	13	11	27
11th	1st Septem.,	4	5	14	23
12th	8th Septem.,	10	7	13	30
13th	15th Septem.,	7	4	11	22
14th	22d Septem.,	0	1	3	4
15th	29th Septem.,	0	2	3	4
16th	6th October,	0	2	0	2
	Totals,	41	49	77	167

Of the 167 deaths, 96 were in males, and 71 in females. From looking over the entries in the register, I consider that about twenty deaths otherwise registered ought to have been entered as from cholera; these deaths were registered under colic, diarrhœa, and several other names; but, from the short duration of the illness, the age, the fact that subsequent deaths in the same house or family were registered as from cholera, these cases must have been cases of the epidemic. Accurate registration will never be secured till the whole department, from its head down to each district registrarship, is filled by medical men. I have heard the combined population of Chatham, Rochester, and Strood assumed to be 50,000; and 167 deaths to 50,000 inhabitants is in the proportion of one death in 299 inhabitants.

Duration of the Cases.

With regard to the duration of the cases, I drew up a form for each district, to be filled up with certain particulars of each case; there were four columns for the duration of (1) the premonitory diarhœa, (2) cholera, (3) consecutive fever, and (4) total duration. Often, from the register, it was not possible to fill up any column but the one headed Cholera; but sometimes the other columns could also be filled up. The whole time is reckoned in the following table, which I beg may be understood as giving the information only to be derived from the registers.

The following table shows the duration of the cases in the three districts; it exhibits the proportion of cases where only a few hours are left for the employment of remedies.

Table VII.

Number of Cases.—District of

Duration of the Cases.	Strood.	Rochester.	Gillingham.	Total.
Duration not ascertained	3	1	2	6
Of 4 hours' duration	0	1	0	1
Of 5 hours	0	0	1	1
Of 6 hours	0	0	1	1
Of 7 hours	1	0	1	2
Of 8 hours	1	2	3	6
Of 8 hours and under	2	3	6	11
Of 9 hours	1	0	3	4
Of 10 hours	0	0	1	1
Of 11 hours	0	0	2	2
Of 12 hours and under	7	7	18	32
Of 24 hours and under	21	26	46	93
Of 48 hours and under	25	34	58	117
All above 48 hours	10	12	15	37
Of 3 days	2	3	1	6

Duration of the Cases.	Number of Cases.—District of Strood.	Rochester.	Gillingham.	Total.
Of 4 days . .	0 ...	0 ...	1 ...	1
Of 5 days . .	2 ...	2 ...	1 ...	5
Of 6 days . .	2 ...	0 ...	0 ...	2
Of 7 days . .	1 ...	0 ...	2 ...	3
Of 9 days . .	0 ...	0 ...	1 ...	1
Of 11 days . .	0 ...	1 ...	0 ...	1
Of 13 days . .	0 ...	0 ...	1 ...	1
Of 15 days' duration	0 ...	0 ...	1 ...	1
	41	49	77	167

The following table is an abstract of the preceding one, and it shows that the average duration of the fatal cases was fifty hours and a-quarter.

Table VIII.

District of	No. of cases of which the duration was ascertained.	Total duration in hours of these cases.	Average duration of each case. Hrs. Mins.
Strood, ...	35 ...	1705 ..	44 52
Rochester, ...	48 ...	2052 ...	42 45
Gillingham, ..	75 ..	4363 ..	60 50
Total, ...	161 ...	8120 ...	50 23

State of the Weather during the Epidemic.

We have all kinds of weather both during a cholera epidemic, and also when there is no cholera present. I noted the character of the weather during the epidemic, but there was no striking connection between its description and any rise or decline in the number of cases. In September there were 19 days wholly fair, and 11 partly rainy. In October, 18 fair days, and 13 partly rainy. During a cholera epidemic, what is most to be desired is the prevalence of high winds. The absence of rain is also an advantage.

Of the State of Health of the Chatham Division of Royal Marines.

In taking the liberty of making a few remarks on this subject, I hope I shall not be considered as trespassing within the province of others better able to do it justice; and I must not omit in this place to return my thanks to Deputy-Inspector Drummond, Royal Marines, principal Naval Medical Officer at Chatham, for his kindness, and the facilities he afforded me for acquiring much of the information contained in the present account.

Number of Sick in Melville Hospital in 1848 *and in* 1849.

By taking the sum of the daily sick-rations for a month, and

dividing by the number of days, we find the average daily number of sick.

The following table shows, for each month of both years, the average daily number of sick officers, marines, and seamen, and omits officers of the hospital, nurses, and servants. Fractions are omitted.

Table IX.

Average daily number of Sick.

Month.	Year 1848.	Year 1849.	Average daily increase in year 1849.
January,	140	145	5
February,	154	157	3
March,	145	148	3
April,	148	158	10
May,	135	138	3
June,	117	162	45
July,	130	176	46
August,	130	201	71
September,	133	170	37
October,	127	153	26
November,	128	135	7
December,	127	137	10
For the Year,	134	156	22

From the time that Melville Hospital, in 1824, was opened, up to the end of 1849, the date when it contained the greatest number of sick was the 23d of August 1849, when they numbered 234. There were more marines at Chatham in 1849 than in 1848; and for the first quarter of 1849, the increase of sick corresponds to the increased number of men; the additional increase afterwards in the number of sick over that in 1848, shows what is due to the presence of cholera and epidemic diarrhœa.

To show the weekly progress of the epidemic, I give the following table.

Table X.

Weekly Number of Cases of Diarrhœa and of Cholera admitted into Melville Hospital.

In the 1st Week, ending on	No. of Cases of Diarrhœa.	No. of Cases of Cholera.	Total No. of Cases of the Epidemic.
Saturday, 14th July,	1	0	1
2d „ 21st July,	3	0	3
3d „ 28th July,	4	0	4
4th „ 4th August,	4	0	4
5th „ 11th August,	15	1	16
Carry forward,	27	1	28

In the	No. of Cases of Diarrhœa.	Cholera.	Total No. of Cases of the Epidemic.
Brought forward,	27	1	28
6th Week, 18th August,	31	13	44
7th „ 25th August,	36	9	45
8th „ 1st Sept.,	10	2	12
9th „ 8th Sept.,	9	1	10
10th „ 15th Sept.,	6	4	10
11th „ 22d Sept.,	4	0	4
12th Week, ending on Saturday, 29th Sept.,	6	1	7
Totals,	129	31	160

During the week preceding the above account, and the week following it, there was no case of the epidemic admitted. Of the above 31 cases of cholera, 28 were in marines, two were in seamen, and one was in a hospital servant. All the 129 cases of diarrhœa were in marines. According to the above table, in 160 cases of the epidemic, there were 31, say 30, cases of cholera, and 129, say 130, cases of choleraic or epidemic diarrhœa, severe enough to be taken into hospital, slighter cases being excluded. This is in the proportion of 80 per cent. of the epidemic being diarrhœa, and 20 per cent. being cholera; or, in every five cases, four of diarrhœa and one of cholera: this estimate including those cases only of diarrhœa which were severe enough to incapacitate the individuals from attending to their usual occupations.

It was, of course, only the more profuse cases of diarrhœa which were admitted into Melville Hospital; a number of other men were affected with bowel complaint, and were prescribed for in the morning; some were excused from duty for the day, remained in barracks, and next day, if they were worse, were taken into hospital; others were under out-door treatment for two or three days, and attended to their duty as usual. From the 15th to the 21st of August, the out-door diarrhœa cases averaged 24 a-day. From the 21st August to the end of the month, the daily average was about 12 or 13. I think I am correct in considering, that as many men were ill of diarrhœa without being taken into hospital, as there were admitted. According to this view, we have 30 cases of cholera, 130 cases of slight diarrhœa, and 130 cases of more profuse diarrhoea, in every 290 cases of the epidemic. This is in nearly the following proportions: in 100 cases of the epidemic, we may consider that there are 45 cases of slight diarrhœa, 45 cases of more profuse diarrhœa, and 10 cases of cholera.

Of Epidemic Diarrhœa and of Non-Epidemic Diarrhœa.—During the continuance of a cholera epidemic, it is usually considered that most of the cases of diarrhœa owe their existence to the presence of the "epidemic influence;" but it would appear that sufficient consideration is not given to the possibility, or rather probability, that *some* of the diarrhœa cases do not belong to the epidemic, but represent that diarrhœa which exists in ordinary years, when there is no cholera present, and which varies in its degree of prevalence according to the season. The peculiarities of naval and military medical practice afford facilities for comparing the extent of diarrhœa prevalence, according to the number of men, greater than can be conveniently found in private practice. At ordinary times, when cholera is absent, we still have diarrhœa prevailing to some extent; and by ascertaining the average degree of this, and deducting it from the total number of diarrhœa cases occurring during the epidemic, the remainder may be set down theoretically as arising from the choleraic constitution of the air, or, if some of my readers will permit me to add, from infection. It may be difficult, or in many cases impossible, for *any one* to say whether certain individual cases belong to the one kind of diarrhœa or to the other; but numerically and statistically, as regards the totals, the truth may be approached or reached. I am well aware that here some medical men will say, that, as the treatment must be, or may be, the same, it is of no practical moment to inquire, whether a case of diarrhœa be of an epidemic or of a non-epidemic nature, and that the inquiry is unnecessary. For the sake of others who think differently, I have made the following comparisons of the amount of diarrhœa prevalence during the non-cholera year of 1848, and during the cholera year of 1849, in the Chatham *Division* of Royal Marines, as shown by the admissions into their hospital.

Second Quarter, 1848.—From 1st April to 30th June. The average strength of the *division* was 894, being 38 officers, and 856 men. During the quarter, 623 were admitted to hospital; of these 523 were marines, and 87 were seamen. In April, of diarrhœa, one case; in May, one case, (also two cases in seamen, and one case of dysentery); in June, one case; being three cases in 894 men, or one case in 298 men; seamen are not included.

Third Quarter, 1848.—From 1st July to 30th September. The average strength of the division was 916. Admitted to hospital, 611, of whom 502 were marines, and 109 were seamen. In July, of diarrhœa, eight cases; in August, 17 cases, (also one in a seaman); in September, eight cases. Being 34 cases of diarrhœa in 916 men, or one case in 27 men, showing a much greater prevalence than during the previous quarter.

Second Quarter, 1849.—From 1st April to 30th June. The average strength of the division was 1316, being 70 officers, and 1246 men. During the quarter, admitted to hospital 799, of whom 704 were marines, and 95 were seamen. Admitted with diarrhœa, in April, nine cases; in May, four cases; in June, eight cases; all these cases were in marines. Being 21 cases in 1316 men, or one case in 62 men, (one in $62\frac{2}{3}$). This is a much greater proportionate amount of diarrhœa than in 1848; the first cholera death in Chatham Proper was on the 28th of July. In future years, when during any month there is much more than the average number of diarrhœa cases according to the season, there may be reason to apprehend the approach of cholera.

Third Quarter, 1849.—From 1st July to 30th September. The average strength of the division was 1338, being 70 officers and 1268 men. During the quarter, admitted to hospital 973, of whom 868 were marines, and 105 were seamen. Of the cases, 397 were medical and 572 surgical. Admitted with diarrhœa 132 cases (also two cases in seamen); with cholera, 31 cases, of whom 28 were in marines, two in seamen, and one in an attendant.

In 1338 men, 132 cases of diarrhœa is in the proportion of one case in ten men (or one in 10·13).

In 1338 men, 28 cases of cholera is in the proportion of one case in 47 men (or one in 47·78). Five of the marine cholera cases died; in 1338 men, one death in 267 men. Of the epidemic, 160 cases in 1338 men is in the proportion of one case in eight men (or one in 8·36).

Six Months, 1848.—To 3·35 per thousand men, the proportion of diarrhœa cases to the strength, in the second quarter, we add 37·11 per thousand, the proportion for the third quarter, making 40·46 per thousand for the six months.

Six Months, 1849.—To 15·95 per thousand men the proportion of diarrhœa cases to the strength in the second quarter, we add 119·57 per thousand as the proportion of diarrhœa and cholera cases in the third quarter, making 135·52 per thousand for the six months. Deducting 40·46, the proportion for 1848, from 135·52, we have remaining 95·06 per thousand, representing what may theoretically be considered to belong to the epidemic. The 40·46 cases being supposed to represent the usual average number of diarrhœa cases to be met with at that season in ordinary years. Supplementary to this view, there is nothing inconsistent in supposing the instance of a diarrhœa case arising from an accidental or non-epidemic cause, and continuing for two or three days to preserve this character, and then having superadded to it a pathological character derived from the epidemic influence. [It is hardly necessary to observe that *pathological* is used here in its original and more correct sense, and that it does not refer to mor-

bid anatomy.] In 1848 the extent of diarrhœa prevalence is represented by 40, and in 1849 the extent of the diarrhœa and cholera prevalence is represented by 135; of which 40 represents the usual diarrhœa, and 95 the cholera and the epidemic diarrhœa. The diarrhœa of 1849 was isotypic and heteropathic. [In Dr Hays' American Journal of the Medical Sciences for 1844, is an excellent paper by Dr Harden, in which he describes some diseases as being isotypic and heteropathic, and others as being heterotypic and isopathic.]

Form of a Register for Cholera Cases.

When noting down the cases of the epidemic occurring among the marines, I used a pocket blank book, ruled with twenty seven columns, for:—the number of the case, patient's name, rank, age, number of the barrack room from which he was admitted, name of barracks, whether the marine or Brompton, day and hour of admission, number of ward in hospital, whether already a patient in the hospital, coldness, lividity, nausea, vomiting, rice-water vomiting, purging, rice-water purging, chalky stools, griping, spasms, if urination natural, if consecutive fever (or secondary fever), whether cholera or diarrhœa, to be marked in the column by C or D; result and date, duration of attack, in four columns for, 1. premonitory diarrhœa; 2. cholera; 3. consecutive fever (or secondary fever); 4. total duration. In each column, under each heading, a single mark showed whether the patient had or had not such a symptom, and security was taken that no symptom could be omitted to be noted. These columns filled two opposite pages, and over the leaf, the patient's name written in the ruled line in its place, left space for some further particulars. In this way it was easy to find what proportion of cases were complete in all the symptoms, and what symptoms were less frequently met with. This plan does not interfere with keeping more detailed and full accounts of the more important cases and of all the cases of cholera. Noting the number of the barrack-room may lead to discovering that certain rooms or certain parts of a barrack furnish more cases than others.

Localities of the Cholera Cases in the Marine Barracks.

It has been already mentioned that the main body of the men's barrack is a building of four floors, of which the lowest is in front, a sunk floor, a passage of four feet wide going along in front of the windows, and separating these rooms from any dampness in the bank of earth; the wall keeping up this bank is as high as the top of the windows. In the building there is a double row of rooms, one with windows to the front, and the other with windows looking to the rear and the Medway. The front rooms in the

sunk flat would not, I suppose, be occupied if the barracks were not crowded; they would probably not be thought good enough to be occupied at ordinary times. At this time they were all in use; there are eight of them, and their numbers are 1, 2, 17, 25, 26, 41, 49, and 50. As the building is of four flats, each having two rows of eight rooms, this front sunk flat is one eighth of the building, and it is a striking fact that it furnished no fewer than eight cholera cases out of the 26 marine cases *in barracks* (two of the 28 marine cases, Moss and Bennet, were not living in barracks). Room number 17 furnished, out of eight or nine inmates, Robinson, Burke, and Woodgate, fatal cases, and Harvey, who recovered. Room 25 furnished Alder, a fatal case, and Frost, who recovered. Room 50 furnished Serjeant Hopper and Henson. Room 49 furnished Hicks. On August 20th, after so many cases coming from No. 17, Mr Drummond caused it to be closed; its inmates were removed to No. 34, the former inmates of 34 being distributed among several other rooms. The solution of the chloride of zinc was also employed in the room, and along the passage, and in a drain which led off from one end of it; I may observe that this drain or sink was not at all in a bad state, the passage was whitewashed. In room 17, the cases commenced on the 13th, 15th, 17th, and 19th of August: this room did not differ in any respect from the others in the same row; the particulars respecting it will probably be considered by infectionists to favour their views.

On account of the ground sloping down towards the river, the back row of rooms on the lowest flat were on a level with the ground. Here, however, in the passages from the front to the back of the building, there was less ventilation than in the upper floors. This back half of the lowest floor furnished five cases:—Spencer, a fatal case, room 3; Twells, room 51; Macgravy, 27; Mulvey, 42; and Bovis, from No. 4 room; and likewise a sixth case, Mary Ann Day, infant daughter of Serjeant Day, died of cholera in room 4 on 31st August, after 24 hours' illness.

Besides these cases of cholera, there were in the lowest flat in front ten cases, and in the rear twelve cases, admitted to hospital with epidemic diarrhœa.

Thus we have thirteen cholera cases in the lowest floor, while in the other three floors together, and all occupied to the same extent, there were only thirteen cases. This clearly shows the preference that cholera has for the lowest situations, and those worst ventilated.

I shall now consider the exact number of men living in the Marine Barracks. The strength of the division was 1338, but from this number we may deduct about 338 to represent married officers living out of barracks, their servants, a number of married

men, an average number usually in hospital, and the men living in Brompton Barracks. According to this view, there were, in 1000 men occupying the barracks, five cholera deaths.

Having compared the cholera prevalence in one part of the Marine Barracks with the other parts, we may next compare its prevalence in the Marine Barracks, and in the Line Barracks, situated higher up on the slope of the hill, where, in 2000 men, there were two cholera deaths. In the Marine Barracks there were proportionately five times more deaths than in the Line Barracks, and there does not appear to be any cause for the difference, except the low situation of the former. There are some particulars bearing on the subject of infection connected with the two deaths in the Line Barracks. Her Majesty's hired transport, *Marlborough*, sailed from Portsmouth with troops for the East Indies, —cholera appeared on board, and the vessel returned to Portsmouth,—some of the troops were landed, and remained there;—sixteen others were sent on to Chatham, where they were placed under observation, and among them occurred the two deaths in question in the Garrison Hospital. Did these men acquire the disease in the same way as others in Chatham? Or had they been infected in the *Marlborough?* Infectionists will consider that there is some probability in the latter view. I regret being unable to give the dates of the *Marlborough's* return, &c. The soldier of the 96th Regiment, aged 22, died, after fourteen hours' illness, on the 31st August; and the soldier of the 52d Regiment, aged 20, died on the 4th September, after five days' illness.

Second Attacks of Cholera.

Hardinge, from room 8, was seriously ill of severe cholera from the 17th to the 27th of August, and was ill of a second and milder attack from the 13th to the 25th September; he had for some days before the 13th been confined in No. 67, the *dry-room*, which is cold, sunless, and somewhat damp. In Gillingham district, on September 4, a male, aged 41, died after twenty hours' illness, of a second attack. These two instances are the only ones I was able to discover of a second attack of cholera. There were various instances of a second or third attack of the *epidemic*, *i. e.*, of rather profuse diarrhœa, these being for a week or so perfectly well, and then having either diarrhœa again or cholera. Also an instance of cholera, followed some weeks after by epidemic diarrhœa.

Is Cholera Infectious?

The division of the profession on this subject is well shown by the circumstance, that in two of the standard works on the practice of physic, different opinions are expressed;—Dr Craigie, in

his Practice of Physic, being against, and Dr Copland, in his Dictionary of Medicine, being in favour of, the opinion that cholera is capable of being communicated by infection. In 1832, the views on this subject were very different from what they are at present. In the former epidemic, ships arriving from certain ports were medically visited, fears were entertained of the risk of making examinations of those who had died of cholera, and these were interred in ground detached from the usual burying-ground, from a fear of danger on the ground being afterwards opened. In 1849, there was no medical visitation and inspection of ships, no separate burying-grounds; and, instead of being afraid of making examinations of the dead bodies, in Professor Goodsir's rooms in the University of Edinburgh, during the first month of the winter session, 1848-9, there were dissected thirty-nine bodies, all, or nearly all, of whom died of cholera.

The words *infection* and *contagion* are sometimes used with different shades of meaning; one writer employs them as being synonymous; another attaches to infection a precise meaning, to distinguish from contagion, while a third reverses this distinction. I prefer the following view:—Some diseases, as typhus fever, are infectious, or are conveyed to the healthy by their inspiring the air (1.) expired by the sick, or coming from their bodies, this being personal infection; (2.) fomital infection, is where the infecting air comes from the body-clothes or bed-clothes of a typhus patient.

(Fomes, *Wood, Turf, or other Matters used to preserve the remains of a Fire, so as to rekindle it.*)

Other diseases, as scabies, are contagious, being acquired by contact with a person having the disease; this may be either (1.) personal contagion, as shown in touching the person of a patient with scabies; or (2.) fomital contagion, as shown in touching or wearing the body-clothes or bed-clothes of such a person.

It is at the beginning, and also at the close of an epidemic that, it is most easy to trace the signs (if any) of infection, as in the middle of an epidemic these are apt to be obscured by the great abundance of cases, and all the attacks are apt to be attributed to the epidemic influence.

Facts Bearing on the Disputed Question of Infection.

In Cliffe parish, in Strood district, there were twelve cholera deaths, of whom no fewer than eight were in several families of the name of Mayor; there was nothing peculiar in the dwellings of these persons, and it seems more likely that infection caused some or most of the eight attacks, than that, in a parish containing 850 inhabitants, eight fatal cases in twelve should have oc-

curred accidentally and merely from the epidemic influence among persons related to each other. In many parts of Scotland, where a large majority of the residents have the same family name, it would not be surprising to find many of the name of Stewart, or Campbell, or M'Donald attacked, but in Cliffe, Mayor is not more common than any other name.

In Gillingham district, I have already alluded to the particulars respecting room 17 in the Marine Barracks, and to the two soldiers sent back from the *Marlborough*, and who were the only patients who died in the Line Barracks. In this district the first cholera case was that of Anthony Strenatt, aged 25, an itinerant musician, a foreigner (either an Italian or a German); he was from the direction of London, Greenwich, and Gravesend, and was intending to pass on to Maidstone; he was found ill of cholera on the roadside, not far from Chatham Workhouse (Medway Union Workhouse), on the 27th July, and died on the 28th, after twenty-four hours' illness. In the workhouse he was assiduously nursed by Charles Terry, aged 63, who was incessant in his attention, and was the only one so employed. Terry was seized with cholera, and died on the 31st July, after twenty-eight hours' illness, being the second death in the district. The next cholera death in the workhouse was on the 24th of August, the fourth was on the 25th of August, and the last death in the district took place in the workhouse on the 28th September.

With these particulars I was obliged, during several visits to workhouse, by the master, and by Mr Hoar, secretary to the Board of Guardians.

The attack of Strenatt favours the infectionists; if he was taken ill simply from the epidemic influence, why was it that he alone, out of 50,000 inhabitants, was seized? The attack occurring not in a resident, but in a traveller newly arrived from other parts, and parts where cholera existed, looks as if he had brought the infection with him. Anti-infectionists may say, that in the town he had last left, he had been exposed to the epidemic influence, and that it had not acted on him till he arrived at Chatham. It may be said that Strenatt was fatigued with travelling on foot; but there were hundreds in Chatham as much predisposed by fatigue as he was, to any disease. If it was not infection, but the epidemic cause which induced the attack of Terry, was it not singular that, of the large number of inmates in the workhouse, the disease should have singled out the man who happened to be the sole nurse of Strenatt? This circumstance certainly looks more like infection than anything else.

Instances where several attacks occurred in the same house and family do not tell altogether in support of the infectionists; it may be the case, as it may be supposed, that close to the

dwelling there are some arrangements at variance with hygeine ;* that some ditch, drain, or sink, attracts the atmospheric poison, or aids the epidemic influence; and that the five or six cases have all arisen from one common cause, and not from one case producing another by infection; but in many instances there is nothing peculiar in the dwellings, and perhaps half of the weight of these cases is on the side of infection. In Gad's Hill, Gillingham, on August 12th and 14th, a son and his father (Chancey) died in the same house. On August 27th, two brothers died in the same house, on Gad's Hill. On Gad's Hill, on September 2d and 3d, two daughters and their mother (Filley) died of cholera in the same house. Gad's Hill is about a quarter of a mile from Gillingham village; where the Filleys lived, there was a row of three houses, on a slope, with their back to the Medway, at the end of the row was an open ditch, not in a very clean state ; in the first house (Filley) were six inmates, five cholera cases, three deaths; in the second or middle house lived Mrs Muncheon, who acted the part of a good neighbour to the Filleys, and attended to them in their illness; she took cholera and died ; in the third house were three cases and one death ; when visiting these patients in company with Mr Weeks, their medical attendant, I neglected to note the number of inmates in the third house. Around these houses the drainage is defective, and there are a good many trees, lessening the ventilation.

On September 11th and 12th, a daughter and her mother (Ward) died in the same house in Luton village; and on September 19th another daughter of Mrs W. died in Cross Street, Chatham.

On September 25th and 27th, died Elizabeth Webb and John W. her husband, in Cross Street, and near the house where Mrs Ward's second daughter had died; she had been to see her family at Luton; it is not unlikely that she was visited in her illness by the Webbs. These three deaths were the only ones in Cross Street.

In Melville Hospital the cholera patients occupied three wards, and the medical officers and nurses visiting these were fourteen in number; one of the medical officers had an attack of epidemic diarrhœa. Five or six men ill of surgical diseases had slight diarrhœa for a few days; in a few cases after diarrhœa for a few days, dysenteric or dysenteroid symptoms appeared for a day or two. An hospital servant, Martin, died of cholera. These were all the cases of the epidemic among the inmates of, or persons connected with, the hospital. If Martin's attack arose from infection, there is no occasion to consider that it was from exposure in

* On hygeine, as connected with cholera, there are many interesting observations in Dr Fred. Jas. Brown's Naval Hygeine. London, 1849.

the hospital, as his duties did not require him to enter the cholera wards, or indeed any of the wards.

Samuel Martin, aged 54, a highly respectable and worthy man, was related to the Filleys, already mentioned, and for some days and nights had been assiduous in his services to them whilst under the disease. Exhausted in body, and depressed in mind, he walked from Gad's Hill to the hospital at 11 P. M. on September 4th, and retired to his single-bedded room. On September 5th, about half-past 1 A. M., he was heard to moan in his room, and was immediately visited. He had been seized about half an hour after retiring to bed; the voice was feeble; the whole body cold and livid; pulse almost imperceptible; cramps in the abdomen and extremities; his bedding, and the floor of the room, were covered with the copious watery evacuations from the stomach and bowels. He was removed to another room, placed in a heated air-bed; had two grains of calomel every ten minutes, and received other appropriate treatment; but he died at half-past 5 A. M., after six hours' illness. Martin had been allowed to visit his sick relatives daily, but the evening before at the hospital he appeared in his usual health; it was afterwards found, that for two or three days he had been labouring under diarrhœa, for which he had treated himself with some anti-diarrhœa mixture, which he knew the patients were taking.

I have endeavoured to give an impartial account of all the facts I was able to discover in Chatham, bearing on the *vexed question* of the infectiousness or the non-infectiousness of cholera. This is a subject on which every reader of this Journal thinks for himself, and it is almost unnecessary for an individual to express his own opinion on it. Laying aside all the probabilities and improbabilities of any theories, and all arguments derived or supposed to be derived from analogy, I am inclined to think that there are *facts* sufficient to *prove* that cholera is to some extent communicable by infection. The difficulty lies in ascertaining the degree of this communicability. Cholera seems to prevail principally in an epidemic manner, and from the epidemic influence; and, secondly, to spread, but in a much smaller degree, by infection.

Some writers think it difficult to imagine a disease to be both epidemic and infectious; but this difficulty is one of their own making; all they have to do is to observe nature, and not to attempt to force nature to fit into what they conceive to be a probable theory.

If it be allowed, that cholera is to some unknown extent infectious, then it becomes the duty of those holding this opinion to employ some disinfecting agent which may destroy, or at least lessen, the risk of proximity to cholera patients. We may suppose that a person seeing much of cholera patients runs two risks of an attack; first, like any other resident in the same town, he

runs the risk of an attack from the epidemic influence; and, secondly, in addition to this, he runs a risk from infection, and this second risk may perhaps be guarded against by the use of a disinfecting agent.

Theory of Disinfection.

Some of our best medical authorities* do not agree in the meaning they appear to attach to the word disinfect; some restricting it to an action on infectious miasm, and others apparently extending it to an action on offensive odours not in any way connected with infectious miasmata. By a disinfecting substance I understand one which either (1) destroys infection, or (2) greatly lessens its intensity.

According to Liebig,† ammonia is always generated in a sick-room, and particularly so where the disease is infectious; he also considers that it is ammonia which renders the infectious principle volatile, and consequently efficient.

In an essay‡ by me on Antiseption, Deodorization, and Disinfection, published in 1848, I took up the theory of Liebig where he left it, carried out his views further, and made use of them to form a theory of disinfection; being, as far as I know, the first person to explain the manner in which a disinfecting substance acts. We, of course, draw a broad line between *deodorization* and *disinfection*, words sometimes confounded or used indiscriminately. Odours are of two kinds,—natural odours, as of flowers, and odours from decomposition (which latter may be called disodours). It is only on these last that a deodorant agent, as for example the solution of chloride of zinc, acts; and it does so by acting on the ammonia which (according to Liebig) is the bearer of the disodour, or that which renders it volatile. (In other cases, where the odour is that of sulphuretted hydrogen, the chloride of zinc acts directly upon this.) It is impossible to avoid being convinced of its efficacy in destroying disodours, which it does without leaving behind any odour of its own, so that it differs from some other substances which, like chloride of lime, destroy the disodour, but leave strong traces of their own odour, or from those objectionable articles called *pastilles*, the burning of which merely overpowers the original smell by creating one

* See Copland's Dictionary of Medicine, Brown in Cyclopædia of Medicine, and Dunglison's General Therapeutics, ii. 275.

† Chemistry applied to Agriculture and Physiology. Edited by Playfair. Chap. 13.

‡ In 1847–8 I was stationed in Montreal, whence I sent, on May 10th, 1848, the essay to the *Edinb. Med. and Surg. Journal;* being too late for the July number, it appeared in the next ensuing one for October 1848. The same essay was published in Dr Hall's Montreal Medical Journal (the *British North American Medical Journal*) on June 1st 1848; in the same month it also appeared in pamphlet form.

still more detestable. In 1847-8, in various large emigrant fever hospitals in Canada, I made very extensive use of the chloride of zinc solution (Sir William Burnett's Disinfecting Fluid); I have also used it in many public establishments, and in emigrant and other ships, and my testimony as to its perfect efficacy in destroying disodours, merely resembles that of all who have made trial of it. As the chloride of zinc solution neutralizes that ammonia which is the vehicle of offensive odours, there is no reason to doubt that it acts similarly on that ammonia which, in a typhus ward, is (according to Liebig) the vehicle of the infectious principle or infecting essence. Analogy and theory lead fairly to this conclusion. And by experiment, I consider that the results of practice lead to the same conclusion. According to these views, the use of a disinfecting agent such as the chloride of zinc appears to be indicated, and by its employment it seems most likely that, during a cholera-epidemic, that part of the risk arising from infection will be either removed, or at least much lessened; infection is a subject so subtle and intricate, and cholera is a disease so eccentric and imperfectly understood, that positive assertions, either for or against, appear to be out of place; but if we cannot discover *the certain*, we can read *the probable*, and in doubtful cases, that rule which appears most likely to be the correct one, has sufficient authority to require to be followed in practice.

There are some who appear to doubt the possibility of destroying infection; for their consideration, I beg to quote Professor Christison, who, in his *Dispensatory*, speaking of chlorine and the chloride of lime, observes: "upon the whole, actual facts, as well as the analogy of its action on putrid emanations, render the existence of the property of neutralizing infectious effluvia, far from improbable."

Consecutive Fever of Cholera.

Degree of Frequency.—For each of the three districts, I drew up a form to be filled up with various particulars, including the duration, separately, of the different stages of the disease. In the *Strood district* list of deaths, the column for consecutive fever is filled up opposite only two cases; a female aged 76, after two days of cholera, had five days of consecutive fever; and a male of two years, after two days of cholera, had five days of consecutive fever; but there are three other cases which, from the duration of the desease being stated to be as much as five or six days (if premonitory diarrhœa be not here included, which is not likely) were probably instances of consecutive fever. This makes five cases in 41 deaths, or one death from consecutive fever in about eight cholera deaths.

In the *Rochester district* list of deaths, a female aged 27, after three days of cholera, had two days of consecutive fever; and a male aged 11, after 24 hours of cholera, had ten days of "typhus" (as the column is filled up). There are three other cases which, from their assigned duration, five days (not including premonitory diarrhœa), were most likely cases of consecutive fever. These make five cases in 49 deaths, or one death from consecutive fever is about every twelve cholera deaths.

In *Gillingham district* the information contained in the register contributed only two entries to the column headed *consecutive fever*. A female, aged 40, after seventy hours of cholera, had twelve days of "congestive fever." And a male, aged 25, after four days of cholera, had five days of "cerebral congestion, with fever." From the duration assiged them, I think that six other cases were most likely instances of consecutive fever. These make eight cases in seventy-seven deaths, or one death from consecutive fever in about nine cholera deaths. According to this estimate, in the three districts, of the 167 who died of cholera, twenty-two died of its consecutive fever, or one in about seven persons (one in 7·59), or 13·17 per cent. This large proportion shows the importance of the consecutive fever.

Among the thirty-one cholera cases treated in Melville Hospital, there occurred six perfect specimens of consecutive fever; their names were Robinson, Spencer, Bennett, Harvey, Moss, and Hardinge (his first attack); the first two died. There was also one instance of secondary fever (Bovis). The proposed distinction between consecutive and secondary fever will be mentioned afterwards. Six cases of consecutive fever in thirty-one cases of cholera is 19·35 per cent. To take the non-fatal cases of cholera,—in twenty-five such cases, there were four cases of consecutive fever, or 26 per cent. To take the fatal cases of cholera,—in six such cases, there were two cases of consecutive fever, or 33·33 per cent. This proportion is much higher than that derived from the total mortality in the three districts, where, although we have the advantage of larger numbers whence to draw our conclusions, still I prefer to take as the just proportion that derived from the Melville Hospital cases, which I have now lying before me, detailed at great length, and with the symptoms noted several times daily. We are more likely to discover the truth from a certain number of cases, carefully and minutely described, than from a much larger number loosely described. In the great discrepancy between the two proportions, there is perhaps another proof of the insufficient amount of correct information which it is possible to extract from the present system of non-medical registration of deaths. There is, however, another view which may be taken, and it is this, that possibly, among the mass of cholera cases in a

town where the sick have not been removed to a cholera hospital, but were treated at their own homes, and consequently could not receive as much attention as the patients of a naval, military, or civil hospital, there were comparatively few of them who survived long enough to become the subjects of consecutive fever, being cut off in the stage of vomiting, purging, &c. In all the above six cases of consecutive fever, the urine was scanty or suppressed, and there was either drowsiness or greater degrees of the same symptom.

Of a Distinction that may be advantageously made between the Consecutive Fever and the Secondary Fever of Cholera.

After a patient has struggled through the severe stage of cholera-proper, and obtains a respite from the great purging, vomiting, spasms, and unnatural coldness, he in some cases merely remains debilitated and weak, and suffers a little perhaps from salivation, or some other effect and sequel of the remedies that have been employed, but at other times he passes into one of four states.

1. Drowsiness and tendency to coma, with diminution or suppression of urine.
2. A feverish state, with chest symptoms.
3. A feverish state, with abdominal symptoms.
4. A combination of any two, or of all three, of the above.

In the register, the febrile state after cholera is sometimes loosely called "typhus," and by other names. In some works, *consecutive fever* is the name given to all the above four varieties; and in a few other publications, *secondary fever* is also applied to all the kinds. I consider that the first set of symptoms are of vastly superior importance and danger to the others, and that it is better to give different names to symptoms so very different in their nature, cause, importance, and in the kind of treatment they require. I would therefore restrict the term *consecutive fever* to those cases where we have these diagnostic symptoms after cholera, a feverish state, drowsiness, and a tendency to coma, the secretion of urine being scanty or suppressed. The *cause* of the consecutive fever is the retention in the blood of the urea, which remains, and acts as a poison on the brain, instead of passing off by the kidneys. The *treatment* is, of course, by those means which may be expected to stimulate or revive the lagging or dormant energies of the kidneys.

Secondary Fever of Cholera.

This term may, with great practical advantage, be confined to cases where, after cholera, there are febrile symptoms, with either

(1) signs of irritation or congestion in the lungs, palpitation of the heart, &c.; or, (2) irritation or slight inflammation of the intestinal mucous membrane; or, (3) a combination of these. Any instances of the above, with also drowsiness and deficient urine, ought to be placed under the more important head of consecutive fever. Instances where, in addition to chest or abdominal symptoms, there is also a somewhat lessened secretion of urine, need not be placed under consecutive fever, unless there be also a tendency to drowsiness. As to the *nature* and *cause* of secondary fever,—in the lungs, in some cases, there is slight obstruction to the easy circulation of the blood, from the circumstance of its having become thicker in consequence of having lost so much of its thinner part by the serous diarrhœa. In the alimentary canal some irritation must often have arisen, from the variety and quantity of the medicines administered. Sometimes, towards the termination of a cholera case, dysenteric symptoms appear for a day or two, but these it does not appear to be necessary to class under the head of secondary fever.

Post Mortem Appearances.

In three examinations there was nothing observed more than is usually seen in fatal cases of cholera. It is stated in some standard works that in fatal cholera the bladder is *always* contracted and empty. In Ader, ill eleven hours, the urinary bladder was contracted and empty. In Woodgate, ill three days, it was contracted, and contained an ounce of urine. In Robinson, ill nine days and six hours, it contained a pint of urine; he had not urinated for four days before death, and before that the urine was very scanty; he died of consecutive fever.

Treatment of Cholera.

The treatment of this pestilence naturally resolves itself into five heads; (1) precautionary measures, or the prophylactic treatment; treatment of (2) the premonitory diarrhœa, or the epidemic diarrhœa; (3) cholera; (4) consecutive fever; (5) secondary fever.

Among the precautionary measures, it is well to attend to being clothed warmly, to avoid travelling at night, especially in an exposed manner, as on horseback, or on the outsides of coaches. Cathartic medicines are to be avoided, and also cold saline purgatives. Unusual articles of food, and any articles likely to produce diarrhœa, are to be shunned.

Treatment of Diarrhœa.—Any of the usual modes of checking diarrhœa may be employed. For children, Dover's powder and mercurial chalk; or chalk mixture. In adults, ten drops of laudanum every three hours till the diarrhœa is checked, or till

three or four doses have been taken; or thirty drops at one dose; or a pill composed of two grains of calomel, and one fourth of a grain or half a grain of opium powder, every two hours. In the aged, a draught of tincture of opium, 10 minims; spiritus ammoniæ aromaticus, half a drachm; and one ounce of peppermint water, every three hours. It is well to give as little opium as possible, as, in the event of the diarrhœa persevering in passing into cholera, it is of advantage to the patient to have been the recipient of as small a quantity as possible of a drug which acts like opium. Another matter to be attended to is, that not more than three or four doses of opium be given in the solid form; if any more doses are given, it is much preferable to give in a liquid form.

Treatment of Cholera.—During the epidemic of 1832, I resided in North Shields, and the usual treatment then and there was by small doses of calomel (gr. ii.) and opium (gr. $\frac{1}{4}$) every three or four hours. Effervescing draughts with carbonate of soda and tartaric acid were also plentifully administered. A cholera hospital was opened, but few patients could be induced to enter it, that class of the public for whom it was intended having some almost incredibly absurd ideas respecting it, these sensible individuals of the intellectual nineteenth century believing that it was opened for the sole and special purpose of giving the surgeons an opportunity of poisoning their patients! The same absurd notions existed in other parts of the country.

Dr Craigie (*Practice of Physic*, vol. ii. 1099, *and Edinburgh Medical and Surgical Journal*, Jan. 1849) and others approve highly of venesection, but only at the commencement of the attack. I presume the manner in which bleeding is useful, is, by lessening the quantity of blood in the system generally, and so leaving a smaller quantity of its thicker part to render difficult the circulation through the lungs after serous diarrhœa has carried off much of its thinner part. It may be useful also by removing some part of the urea already existing in the blood, so that, if the kidneys refuse to do their office, there is less urea in the blood to act as a poison on the brain.

Some practitioners think highly of turpentine, and give it as an astringent. Where it has appeared to be of service, I am inclined to think that it has been beneficial by acting as a diuretic. In Chatham, in 1849, among practitioners generally, I believe, some cases were, especially at the beginning of the epidemic, treated on the stimulant plan, with brandy, &c., and also calomel and opium. Afterwards the stimulant plan was abandoned, and small doses of calomel, either alone, or with opium, were given. Two grains of calomel, with or without two drops of laudanum, at

intervals, varying from every ten minutes to every hour. Latterly in the epidemic the laudanum was not given, but simply the calomel in small and frequent doses.

After having seen different modes of treatment employed, the one I at present prefer is the following:—It does not appear to be a good plan to give two or three drops of laudanum several times every hour with each dose of calomel, as it may counteract the effect desired from the calomel; it is better to give the calomel alone, two grains every ten, twenty, or thirty minutes, according to the urgency of the symptoms. In adults, in some cases, it may be well to begin with a scruple dose of calomel as is usual in India, with the view and expectation of its acting in a sedative manner on the stomach, and not as a cathartic. To restore warmth to the surface, bottles of hot water, or heated bricks wrapped in flannel, or bags of heated bran, may be used.

Hot Air Bath.—When these means do not succeed, the hot air bath may be used. A convenient way of using it is by having a semicylindrical frame of basket-work which covers the patient from the chin to the feet; the lower end of it is filled by a board, at the lower part of which is an opening to admit the extremity of the bent tube, conveying the heated air from a spirit-lamp, which is placed on a stool at the foot of the bed. Three or four blankets cover the basket-work. Where it is not convenient to have the proper apparatus, two long stools, placed on their sides in the bed, one on each side of the patient, and at the foot of the bed a short wooden stool between them, will answer the purpose; the hole in the top of the latter gives admission to any metallic tube (on ship-board, a bent speaking trumpet will answer) conveying the heated air.

We made experiments with spirits of wine and naphtha, to see which was to be preferred. Though naphtha cost less a gallon than spirits of wine, yet the lamp burned more of it, so that (as the prices of each were at the time) the cost was almost exactly the same. Besides, there was some objection to the naphtha from its odour, which is undesirable for the patients, and may conceal odours which ought to be detected. In a public hospital, there is a possibility of spirits of wine being used for other purposes than those ordered by the medical officers, and for those interested in these establishments it may be convenient to know the expense of using the spirit-lamp, possibily for a number of patients at the same time. Spirit of wine was at 22s. a gallon, or 2s. 9d. a pint; the lamp of the cholera hot-air bath or heated-air bed consumed sixteen ounces in ten hours; used for twenty four hours, it consumed forty ounces, costing six shillings and sevenpence. Those about to use it for a number of cases in a cholera hospital will be thus able to know

what the expense of it will be; it will of course depend on the current price of spirit of wine. With respect to America (either British America or the United States), the price of spirit of wine is much less than in Britain. In the 31 cholera cases in Melville Hospital, the hot air bath was used in nine cases; of these, five were fatal: of the non-fatal cases, it was used continuously,—in the instance of Pinfield for nineteen hours, in the case of Hardinge for forty hours, and in that of Harvey for forty-one hours; this shows how long it may be necessary to persevere in the use of the remedy.

As to other methods of restoring warmth, frictions have the disadvantage of requiring the bed clothes to be raised. The warm bath is very well for the twenty minutes or so that the patient is in it, but if he remain longer, faintness is induced. A sheet wet with hot water, and wrapped round the body, answers with children, but not with adults, who soon throw it off. For the vomiting, sinapisms to the epigastrium will sometimes be of service.

In *keeping the case* of a cholera patient, every time, usually three or four times a-day, that an entry is made, it ought to be noted whether the urine is in natural or in diminished quantity; this ought to be done from the very commencement of the case; as soon as any diminution in the quantity of urine is observed, then, in adults, gin in very small and frequently-repeated doses ought to be administered; two drachms every half hour or so; we ought not to wait for drowsiness to appear; it is no doubt easier to keep up and stimulate the action of the kidneys than it is to induce them to take up their office after the urinary secretion has been entirely suspended. In children and delicate females, spirit of nitric ether may be used instead of gin. There are other diuretics, some of which, in particular cases, may be preferable to gin. I do not approve of stimulants, such as brandy or whisky, and gin is here recommended, not as a stimulant, but as a diuretic. Mr Drummond showed me the great advantage and propriety of occasionally using the catheter, where there had been no micturition for a day or two, and sometimes from such patients some ounces of urine were thus removed.

In cases where much calomel has been given, sometimes an unpleasant degree of salivation follows, for which alum or other gargles are required; as soon as the gums become tender, it is better to discontinue the calomel, as salivation is not the effect that is desired, but is only an evil which, in some cases, cannot be avoided.

Treatment of the Consecutive Fever.

Cupping over the region of the kidneys, and blisters to the

same part, have been advised for the purpose of stimulating the kidneys; but most likely, in many cases, the patient is by this time too low to authorise any loss of blood by cupping; blisters are awkward applications under the circumstances. I prefer administering diuretics; to adults, gin; and to children, the spirit of nitric ether may be given with advantage. Leeches to the temples and blisters to the nape of the neck are sometimes applied to relieve the cerebral congestion; leeches do not appear to be advisable, and blisters are, at best, symptomatic treatment; an early and diligent use of diuretics will, I am inclined to think, render these applications unnecessary.

Treatment of the Secondary Fever.

In the 31 cholera cases in Melville Hospital, I consider that only one instance occurred of secondary fever (there were six instances of consecutive fever); the patient's name was Bovis; after cholera he had feverishness, with at first chest symptoms, and then abdominal symptoms. The secondary fever is of but trifling consequence compared with the consecutive fever. The blood, having lost so much of its serum, becomes of a thicker consistence, and passes with difficulty through the minute vessels of the lungs, and hence difficult breathing, palpitation, and sometimes pain in the chest. A blister may be applied, and diluents and time will soon effect a cure. As for the abdominal symptoms, the intestinal mucous membrane having been the seat of the commotion, and having also probably been irritated by the variety and quantity of internal medicines administered, requires some time to return to its natural state. Remedies which do not come in contact with the irritated surface are to be preferred, and hence, fomentations to the abdomen, the turpentine epithem, a sinapism, or blisters may be used; and, generally speaking, the unimportant symptoms as they appear may receive symptomatic treatment. Separating those slight cases, which are here called secondary fever, from the very important and widely-different cases of what is here distinguished as consecutive fever, will, it is hoped, have the effect with any young practitioner, of directing his careful attention to those symptoms by which it is most required.

There are good grounds for believing that the subject of consecutive fever has not been *universally* considered with due attention. Fatal cases of cholera are recorded, and detailed with great minuteness as to many of the symptoms, without any mention whatever being made of the state of the urinary secretion, and where internal evidence is incidentally given that the patient has died of consecutive fever, doubtless from the urinary secre-

tion having been suspended. In the registers, the fact that the duration of the illness of a cholera patient is sometimes stated to have been, cholera for *so many* days, then "typhus" for *so many* days, is perhaps also a proof that the real nature and cause of the febrile state after cholera, with disposition to coma, has not been considered, and not having been considered, the case perhaps has not received that kind of treatment which it would have done, if it had been thought that the retained urea was poisoning the blood, which, acting on the brain, was gradually inducing fatal coma. It is not here pretended that if such cases are recognised they are sure to recover; thus, in Melville Hospital, of six such cases, two were fatal; but if six such cases of equal severity were not recognised, it is likely that five or six of them would end fatally.

Further remarks would be here offered on various points, but the writer is afraid that he has already extended to too great a length these observations on a disease on which so much has been written. In the topographic sketch, and in some of the allusions to the different establishments, perhaps those belonging to the town and to these establishments may observe some particulars a little deficient in that perfect accuracy which a temporary resident finds it difficult to secure. As it is not unlikely that this account will be again printed, I shall be glad to receive from Chatham, from professional friends either in private practice or in the public services, or others interested, any amendments or additions they may have the kindness to make. As I am about to change my address, if such communications be addressed to me, to the *care of John Warrack, Esq.*, 10 *Bonnington Place, Edinburgh*, they will be carefully forwarded to their destination.

Halifax, Nova Scotia,
April 1850.

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